

TAXONOMIC STUDY ON THE LEAFHOPPER GENUS *BHATIA*
(HEMIPTERA: CICADELLIDAE) FROM CHINA

SUQIN SHANG, LIN SHEN, YALIN ZHANG, AND HOHUN LI

(SS, LS, YZ) Key Laboratory of Plant Protection Resources and Pest Management of Ministry of Education, Entomological Museum, Northwest A&F University, Yangling, Shaanxi 712100, China (e-mail: yalinzh@cniipm.com, yalinzh@yahoo.com.cn); (SS, HL) Department of Biology, Nankai University, Tianjin 300071, China. Corresponding author: Yalin Zhang

Abstract.—Five new species of the leafhopper genus *Bhatia* Distant, *B. hastata* Shang and Shen, *B. digitata* Shang and Shen, *B. flabellata* Shang and Shen, *B. quadrispinosa* Shang and Zhang, and *B. unicornis* Shang and Li, are described from China. Figures are provided for these species, *Bhatia koreana* (Kwon and Lee), a new record for China, and *B. biconjugara* Zhang and Zhang. A key to separate these species and *B. satsumensis* Matsumura from China is given.

Key Words: Hemiptera, Cicadellidae, Selenocephalinae, *Bhatia*, new record, new species, China

The parabolooponine leafhopper genus *Bhatia* Distant (Hemiptera, Cicadellidae, Selenocephalinae), described from a misidentified type species (Webb 1994), was established by Distant (1908) and revised by Zhang and Webb (1996). Formerly, the genus contained nine species from Asia and the Pacific, of which *B. satsumensis* Matsumura and *B. biconjugara* Zhang and Zhang were known from China. The record of *B. olivacea* (Melichar) from China (Kuoh 1966, Zhang and Zhang 1998) cannot be confirmed as the identification was based on a female specimen. In addition, it should be noted that the figures 142 and 143 in Kuoh's (1966) paper are switched, fig. 143 shows the general appearance of *Bhatia olivacea* (Melichar) and fig. 142 is for *Phlogotettix cyclops* (Mulsant and Rey).

The present work describes and figures five new *Bhatia* species from China and *B. koreana* Kwon and Lee is a newly recorded species for China. A feature of the genus,

the paraphyses of the aedeagus, is not present in one of the included species and also the degree of attachment to the aedeagus of the paraphyses varies considerably between species. Both situations also occur in some Cicadellinae genera, which, based on other features in these genera, is irrespective of any close relationship between the species (Young 1968: 13).

Type specimens of the new species are kept in the collection of the Entomological Museum, Northwest A&F University (NWAUFU), Institute of Zoology, Chinese Academy of Science (IZCAS), and China Agricultural University (CAU).

Bhatia Distant 1908

Bhatia Distant 1908:357; Zhang and Webb 1996:12; Viraktamath 1998:170.

Type species: *Eutettix? olivacea* Melichar. By original designation.

Melichariella Matsumura 1914:236–237; Ishihara 1954:243–245; Linnavuori 1960:

36; Linnavouri and Al-Ne'amy 1983: 23. Synonymy revived by Zhang and Webb 1996. Type species: *Melichariella satsumensis* matsumura. By original designation.

Koreanopsis Kwon and Lee 1979:50 Synonymised by Zhang and Webb 1996. Type species: *Koreanopsis koreana* Kwon and Lee. By monotypy.

Diagnosis.—Head slightly wider than pronotum; vertex short and wide, more than twice as broad as long, slightly longer medially than next to eyes, anterior margin rounded to face, with a transverse depression subapically; ocelli on foremargin; antennae long. Pronotum finely transversely striate. Forewing elongate with 4 apical cells and 3 subapical cells. Foretibia rounded dorsally, setal formula 1+4. Hind femur with apical setal formula 2+2+1. Male genitalia with pygofer lobe internal ledge (if present) extended diagonally across lobe to its ventroposterior corner; with several macrosetae posteriorly. Subgenital plate triangular with inner side nearly straight. Connective Y- or H-shaped. Aedeagus with one or more basal processes or paraphyses (except *flabellata*).

Distribution.—Widely distributed throughout the Oriental Region and Pacific areas.

Remarks.—The genus is similar to *Athysanopsis* Matsumura but differs from the latter as follows: pygofer lobe internal ledge (if present) extended diagonally across lobe to its ventroposterior corner rather than along posterior margin; subgenital plate with inner side nearly straight rather than with inner apical half constricted. *Bhatia* is separated from other genera of Paraboloponini in the key to genera by Zhang and Webb (1996).

KEY TO SPECIES (MALES) OF CHINA

- 1. Aedeagus without basal processes or paraphyses (Fig. 35) *B. flabellate*, n. sp.
- Aedeagus with at least one basal process 2

- 2. Aedeagus with a single basal process (Figs. 49, 50) *B. unicornis*, n. sp.
- Aedeagus with one or two pairs of basal processes 3
- 3. Aedeagus with two pairs of short apical processes (Figs. 10–12) *B. satsumensis*
- Aedeagus without apical process 4
- 4. Aedeagus with a single pair of basal processes 5
- Aedeagus with two pairs of basal processes. 7
- 5. Aedeagal shaft short and robust, connected to paraphyses by membrane (Fig. 31) *B. digitata*, n. sp.
- Aedeagal shaft elongate, connected to paraphyses directly 6
- 6. Apical process of style short and hooklike (Fig. 16) *B. koreana*
- Apical process of style long and straight (Fig. 20) *B. hastate*, n. sp.
- 7. Apical process of style with apical extension (Fig. 3) *B. biconjugara*
- Apical process of style without apical extension (Fig. 44). *B. quadrispinosa*, n. sp.

Bhatia biconjugara Zhang and Zhang (Figs. 1–6)

Bhatia biconjugara Zhang and Zhang 1998: 178, figs 1A–E.

Distribution.—China (Sichuan, Guangxi).

Bhatia satsumensis (Matsumura) (Figs. 7–12)

Melichariella satsumensis Matsumura 1914: 237–238; Ishihara 1954: 242–243.

Bhatia satsumensis: Zhang and Webb 1996:12, figs 128–133; Zhang and Zhang 1998: 179.

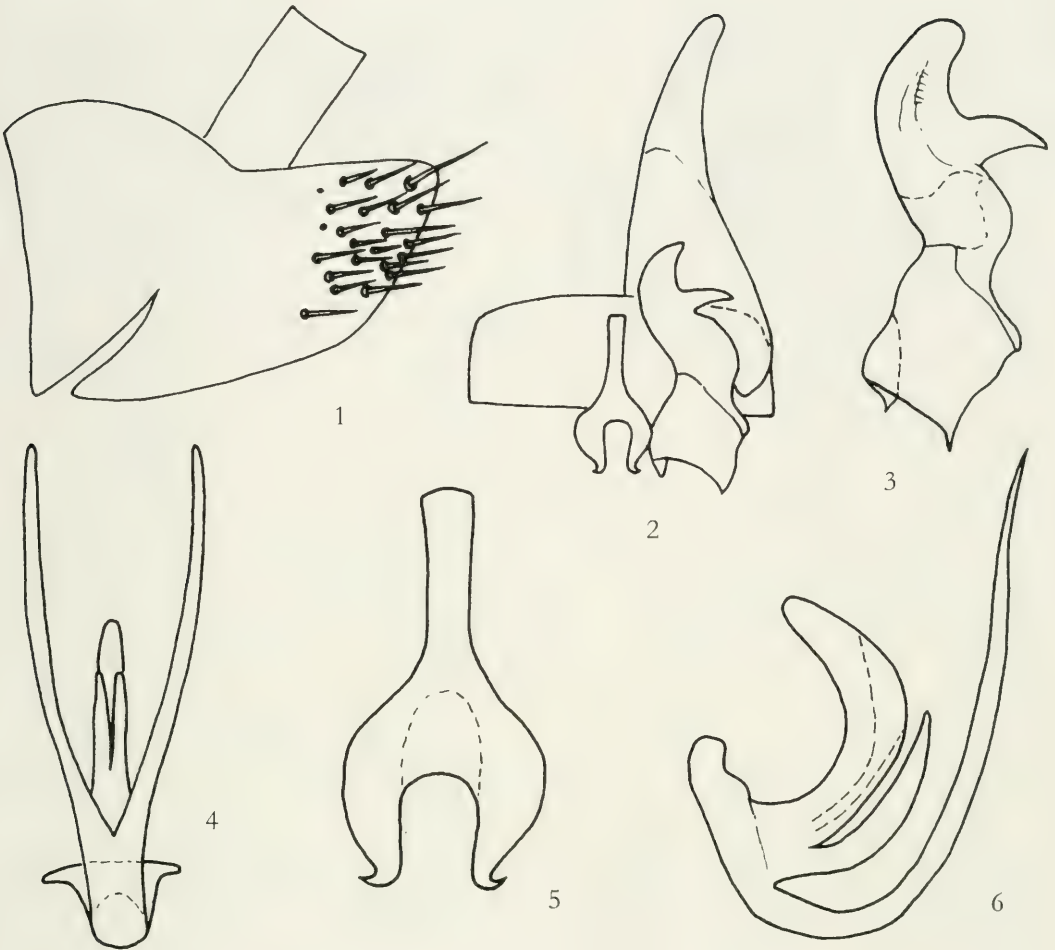
Distribution.—Japan, China (Guangdong).

Bhatia koreana (Kwon and Lee) (Figs. 13–17)

Koreanopsis koreana Kwon and Lee 1979:50, figs. 1–5.

Bhatia koreana: Zhang and Webb 1996: 12, figs 139–144, 490.

Specimens examined.—1 ♂ (IZCAS), Huoditang, Ningshan County, Shaanxi



Figs. 1–6. *Bhatia biconjugara* (from Zhang and Zhang 1998). 1, Pygofer in lateral view. 2, Subgenital plate, valve, style and connective in dorsal view. 3, Style in dorsal view. 4, Aedeagus in lateral view. 5, Connective in ventral view. 6, Aedeagus in posterior view.

province, 1,580 m, 18.viii. 1998, coll. Yuan Decheng. New record for China.

Distribution.—South Korea, China (Shaanxi).

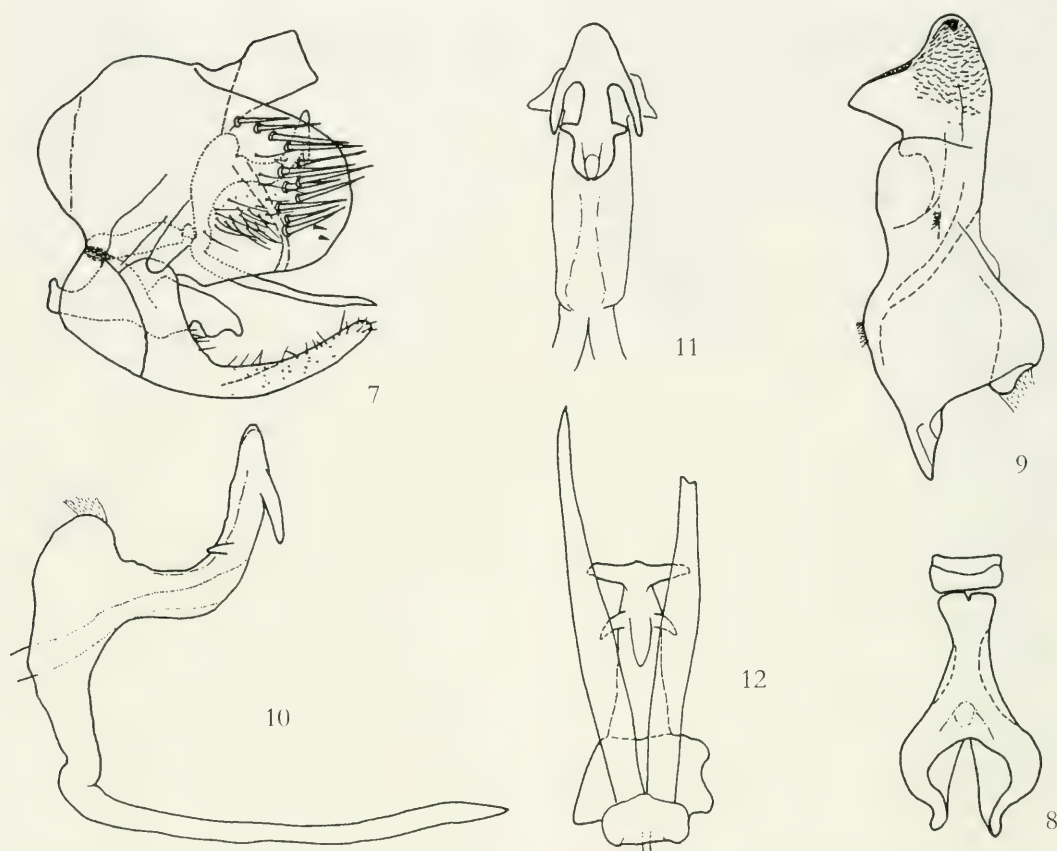
***Bhatia hastata* Shang and Shen,
new species
(Figs. 18–23)**

Male.—Length (incl. tegmen): 8.0 mm. Yellowish brown, head and thorax marked dorsally with brown as in Fig. 18; face deep yellow, pronotum with a yellowish band anteriorly, with dense

dark maculation and yellow spots; forewing brownish hyaline with dark patch at tip of clavus; legs yellowish.

Head with ocelli visible dorsally, approximately 3 times own diameter from corresponding eye. Face with laterofrontal suture extended to lateral margin of ocellus; antennal ledge strong. Pronotum with lateral margins moderately long. Forewing with appendix narrow.

Male genitalia with pygofer side long, triangular; lobe without internal ledge. Valve pentagonal. Subgenital plate elongate, triangular shaped. Style apical



Figs. 7–12. *Bhatia satsumensis* (from Zhang and Webb 1996). 7, Genital segment in lateral view. 8, Connective in ventral view. 9, Style in ventral view. 10, Aedeagus in lateral view. 11, Aedeagus in posterior view. 12, Aedeagus in ventral view.

process very long and straight, slightly tapered to truncate apex, without lateral lobe. Connective H-shaped. Aedeagus with shaft narrow, apex slightly expanded caplike in dorsal/ventral view; preatrium long with a pair of elongate basal processes lateroposteriorly, strongly curved dorsally and exceeding apex of shaft.

Holotype.—♂ (IZCAS), Mt. Shengtang, Jinxiu, Guangxi Province, 900–19,00 m, 28.vi.2000, coll. Yao Jian.

Etymology.—This species is named for its spearlike aedeagal shaft in lateral view.

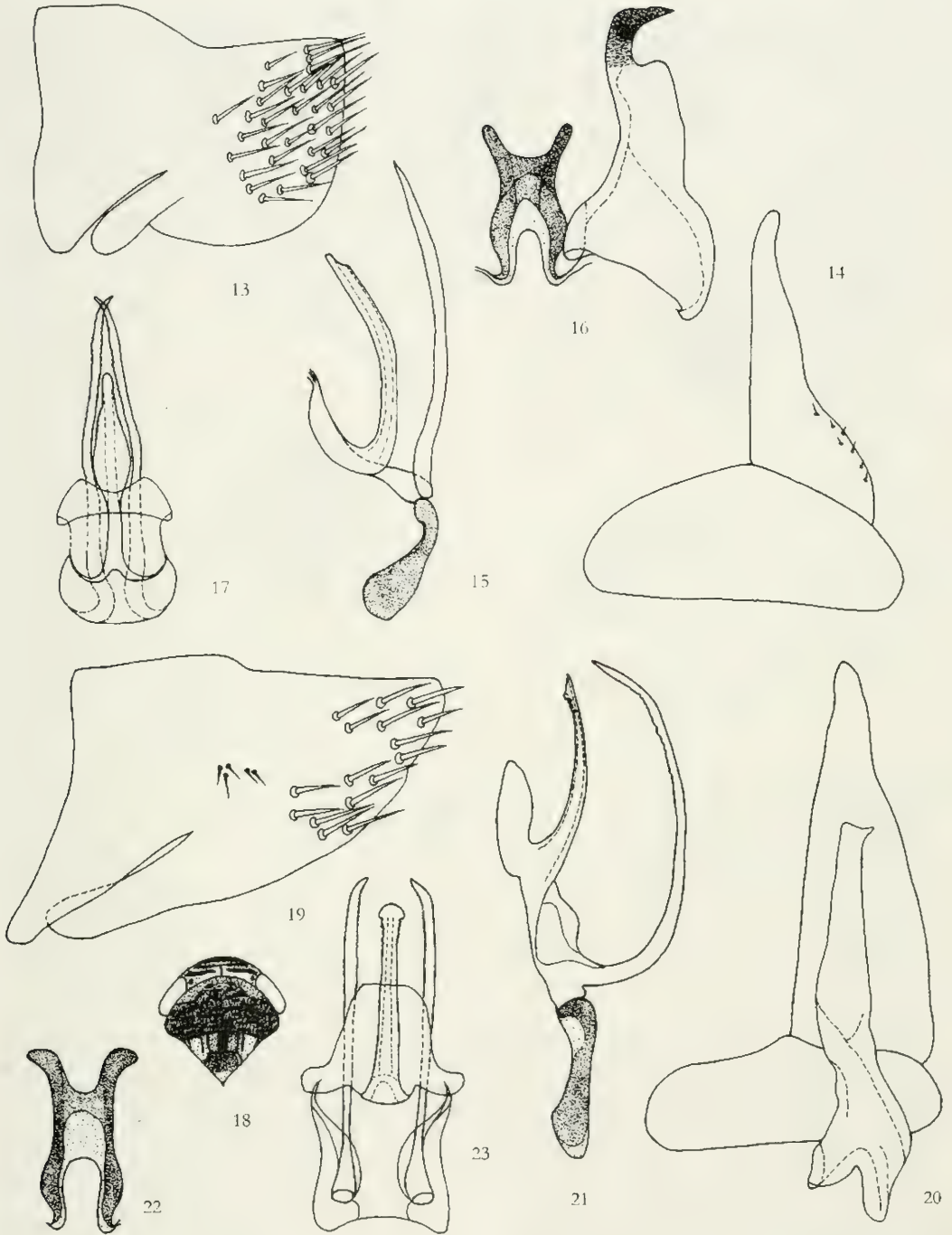
Notes.—This species is similar to *B. koreana* but can be distinguished by:

1) pygofer long and triangular; 2) style with apical process very long, straight and slightly tapered apically, without a lateral lobe; 3) valve pentagonal; and 4) aedeagal shaft slightly expanded apically in dorsal/ventral view.

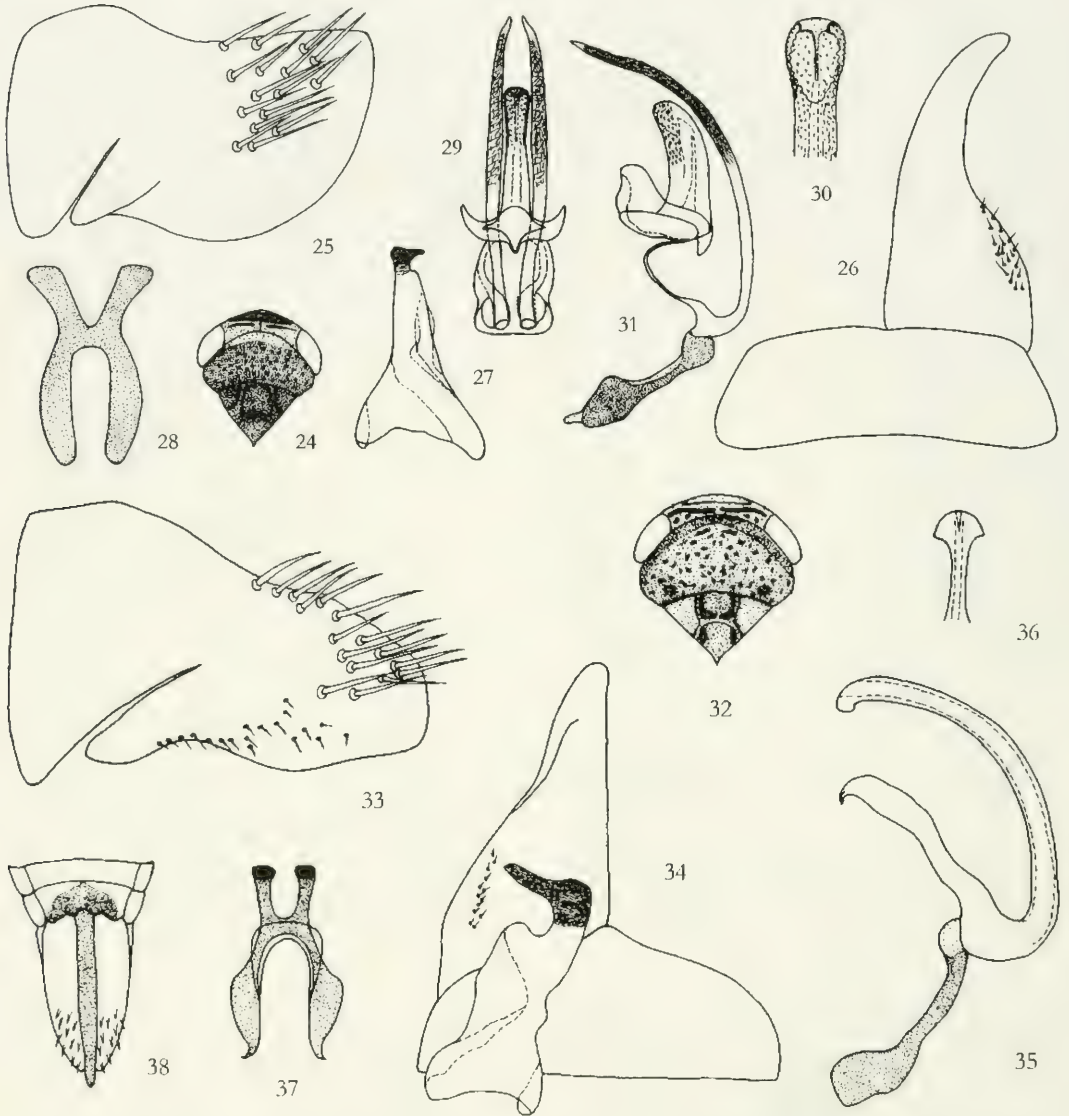
***Bhatia digitata* Shang and Shen,
new species**

(Figs. 24–31)

Male.—Length (incl. tegmen): 6.8 ~ 7.5 mm. Yellowish brown; head and thorax dorsally marked with brown as in Fig. 24; face brown with base of frontoclypeus yellow; forewing light brownish hyaline, with spot at tip of clavus; legs brown.



Figs. 13-23. 13-17, *Bhatia koreana*. 13, Pygofer in lateral view. 14, Valve and subgenital plate in ventral view. 15, Aedeagus and connective in lateral view. 16, Connective and style in ventral view. 17, Aedeagus in dorsal view. 18-23, *B. hastata*. 18, Head and thorax in dorsal view. 19, Pygofer in lateral view. 20, Valve, subgenital plate and style in ventral view. 21, Aedeagus and connective in lateral view. 22, Style in ventral view. 23, Aedeagus in dorsal view.



Figs. 24–38. 24–31, *Bhatia digitata*. 24, Head and thorax in dorsal view. 25, Pygofer in lateral view. 26, Valve and subgenital plate in ventral view. 27, Style in ventral view. 28, Connective in ventral view. 29, Aedeagus in dorsal view. 30, Apex of aedeagus posteriorly. 31, Aedeagus and connective in lateral view. 32–38, *B. flabellate*. 32, Head and thorax in dorsal view. 33, Pygofer in lateral view. 34, Valve, subgenital plate and style in ventral view. 35, Aedeagus and connective in lateral view. 36, Apex of aedeagus posteriorly. 37, Connective in ventral view. 38, Female segment in ventral view.

Head with ocelli visible dorsally, approximately twice own diameter from corresponding eye. Face with laterofrontal suture extended to corresponding ocellus; antennal ledge strong. Pronotum with lateral margin very short. Forewing with appendix narrow.

Male genitalia with pygofer side elongate, upturned apically; lobe without internal ledge. Valve trapezoid. Subgenital plate triangularly shaped, distal half digitate. Style apical process very short, tapered to rostriform apex, lateral lobe slight. Connective H-shaped. Aedeagus

with shaft very short and robust, globular at apex in dorsal/ventral view with many fine spines; a pair of very long and narrow processes basoposteriorly between aedeagus and connective, linked to former by an elongate membranous band.

Types.—Holotype: ♂ (IZCAS), Mt. Shengtang, Jinxiu, Guangxi Province, 900 m, 18.v.1999, coll. Yao Jian, Paratype: 1 ♂ (NWFU), Baotianman, Neixiang, Henan Province, 1,300 m, 11.vii.1998, coll. Hu Jian.

Etymology.—This species is named for its fingerlike aedeagal shaft.

Notes.—This species is similar to *B. koreana* but differs by: 1) pygofer more elongate; 2) apical process of style shorter; and 3) aedeagal shaft short and robust, with many dense fine spines and basal processes linked to aedeagus by a membrane.

***Bhatia flabellata* Shang and Shen,
new species**

(Figs. 32–38)

Male.—Length (incl. tegmen): 7.5 ~ 8.0 mm.

Female.—Length (incl. tegmen): 8.2 ~ 8.8 mm.

Yellowish brown; head and thorax dorsally marked with brown as in Fig. 32; frontoclypeus with a row of short transverse brown bands along each side; pronotum with dense yellow spots; forewing light brownish hyaline.

Head with ocelli visible dorsally, approximately twice own diameter from corresponding eye. Face with antennal ledge strong; laterofrontal suture extended to corresponding ocellus. Pronotum with sides moderately long. Forewing with appendix broad.

Male genitalia with pygofer side broad basally, dorsal margin sloping caudally to narrow, bluntly rounded apex; lobe without internal ledge. Valve pentagonal. Subgenital plate triangularly shaped with

digitate apex; fine setae along lateral margin. Style with apical process short, rostriform, lateral lobe prominent. Connective H-shaped. Aedeagal shaft elongate, strongly curved dorsally, expanded flabellate at apex, without processes.

Types.—Holotype: ♂ (IZCAS), Linhai Villa, Jinxiu, Guangxi Province, 1,000 m, 2.vii.2000, coll. Li Wenzhu; Paratypes: 1 ♂ 1 ♀ (IZCAS), Mt. Shengtang, Jinxiu, Guangxi Province, 900–1,900 m, 28.vi.2000, coll. Yao Jian; 1 ♀ (IZCAS), coll. Chen Jun, other data same as holotype.

Etymology.—This species is named for the expanded flabellate apex of the aedeagus.

Notes.—This species is allied to *B. hastata* but can be distinguished by: 1) pygofer bluntly rounded apically; 2) aedeagal shaft strongly curved dorsally, with expanded flabellate apex; and 3) style with apical process rostriform.

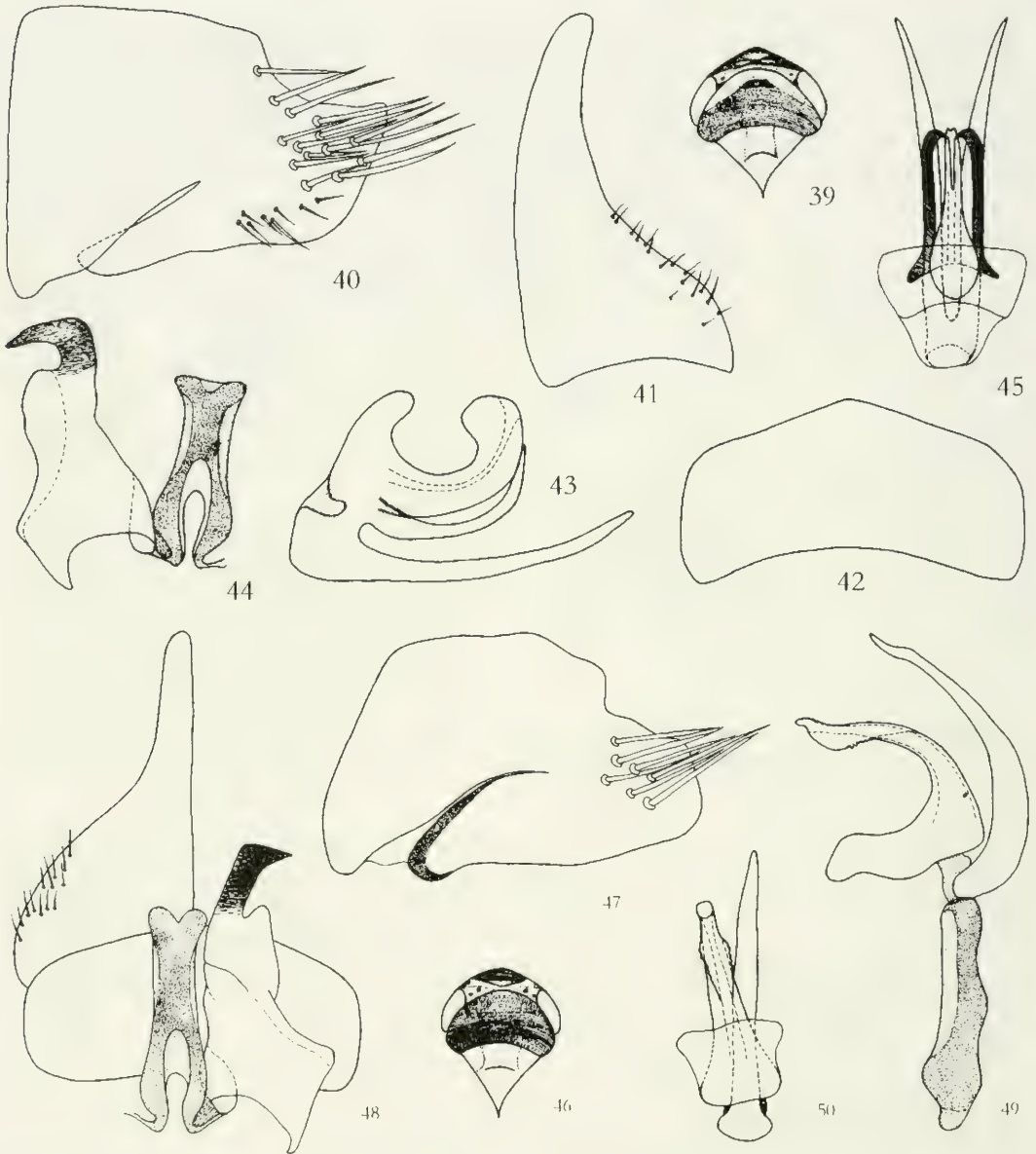
***Bhatia quadrispinosa* Shang and Zhang,
new species**

(Figs. 39–45)

Male.—Length (incl. tegmen): 6.5 mm. Yellow; head and thorax dorsally marked with brown as in Fig. 39; forewing light brownish hyaline with small brown spot at tip of clavus; legs yellow.

Head with ocelli not visible dorsally, approximately twice own diameter from corresponding eye. Face with laterofrontal suture not reaching corresponding ocellus; antennal ledge weak. Pronotum with lateral margin very short. Forewing with appendix narrow. Female pregenital segment with hind margin concave medially, midlength longer than that of preceding segment; ovipositor extending beyond apex of abdomen.

Male genitalia with pygofer side broad at base, dorsal margin abruptly sloping subapically to triangular-shaped apex; lobe without internal ledge. Valve pentagonal. Subgenital plate triangularly shaped with digitate apex, with many



Figs. 39-50. 39-45, *Bhatia quadrispinosa*. 39, Head and thorax in dorsal view. 40, Pygofer in lateral view. 41, Subgenital plate in ventral view. 42, Valve in ventral view. 43, Aedeagus in lateral view. 44, Style and connective in ventral view. 45, Aedeagus in dorsal view. 46-50, *B. unicornis*. 46, Head and thorax in dorsal view. 47, Pygofer in lateral view. 48, Valve, subgenital plate, connective and style in ventral view. 49, Aedeagus and connective in lateral view. 50, Aedeagus in ventral view.

fine setae on lateral margin. Style with apical process rostriform. Connective Y-shaped, stem nearly as long as arms. Aedeagal shaft short and robust, strongly curved dorsally, slightly expanded apically in lateral view, with a pair of

short basal processes and a pair of long lateroposterior processes, former not exceeding apex of shaft and latter longer than shaft.

Types. Holotype ♂ (CAU), Qingyinge, Mt. Emei, Sichuan Province.

20.viii.1961, coll. Jin Ruihua. Paratype: 1 ♀ (CAU), same data as holotype.

Etymology.—This species is named for its four aedeagal processes.

Notes.—This species is similar to *B. biconjugara* but differs in: 1) pygofer side broad basally with dorsal margin abruptly sloping subapically to a triangular-shaped apex; 2) valve pentagonal; and 3) style with apical process hook-shaped.

***Bhatia unicornis* Shang and Li,
new species**

(Figs. 46–50)

Male.—Length (incl. tegmen): 6.8 ~ 7.5 mm. Sordid yellow; head and thorax dorsally marked with brown as in Fig. 46; forewing hyaline with a spot at tip of clavus.

Head with ocelli visible dorsally, approximately twice own diameter from corresponding eye. Face with laterofrontal suture extending to corresponding ocellus; antennal ledge weak. Pronotum with sides very short. Forewing with appendix narrow.

Male genitalia with pygofer side broad basally, dorsal margin abruptly sloping subapically to broadly rounded apex; lobe without internal ledge. Valve pentagonal. Subgenital plate triangularly shaped, tapered to digitate apex, with fine setae on lateral margin. Style with apical process moderately long and truncate apically. Connective Y-shaped, stem longer than arms. Aedeagus with shaft moderately long and robust, curved dorsally, a laterally serrate triangularly shaped flange subapically on each side; a long, stout medial process baso-posteriorly between aedeagus and connective, linked to former by membrane.

Types.—Holotype ♂ (NWFU), Mt. Dinghu, Guangdong Province, 18.vii.1985, coll. Zhang Yalin. Paratypes: 1 ♂, 1 ♀ (NWFU), same data as holotype.

Etymology.—This species is named for its digitate subgenital plate.

Notes.—This species is allied to *B. flabellata* but can be distinguished by: 1) style with apical process moderately long with apical margin truncate; 2) connective Y-shaped with stem longer; and 3) aedeagus with shaft moderately long and robust with a laterally serrate triangular-shaped flange subapically on each side and with a single process baso-posteriorly linked to aedeagus by membrane.

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